Appendix E.11:
Dam and Levee Failure

Hazard Ranking – Dam Failure

The dam hazard ranking was based on the National Inventory of Dams classification of dams located in each parish.

The high / medium / low rankings for each parish were developed by:

- Obtaining the National Inventory of Dams data;
- Sorting the list by parish by high to low dam classification;
- Assigning the high rank to parishes one or more high hazard dams;
- Assigning the medium rank to parishes with one or more medium hazard dams;
- Assigning the low rank to parishes with one or more low hazard dams; and
- Assigning no rank to parishes with no dams with a high, significant or low classification.

The resulting ranked parishes are shown in in Table E-42. Map E-19 presents the ranking of all the parishes with high, medium, low and no risk to dams.

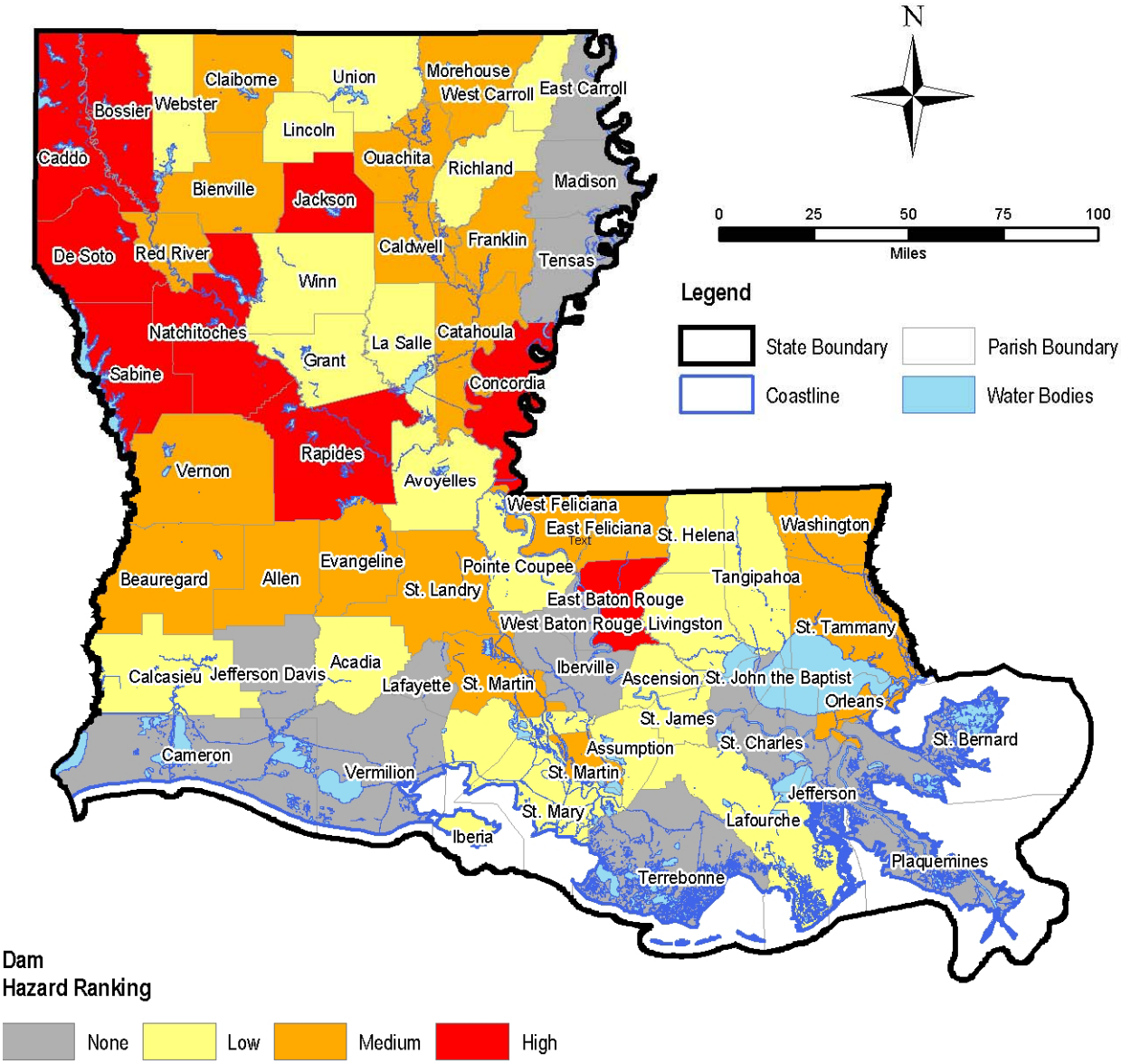
Table E-42. Dam Hazard Ranking for Louisiana Parishes

Parish	Ranking
Bossier	H
Caddo	H
Concordia	H
DeSoto	H
East Baton Rouge	H
Jackson	H
Natchitoches	H
Rapides	H
Sabine	H
Allen	M
Beauregard	M
Bienville	M
Caldwell	M
Catahoula	M
Claiborne	M
East Feliciana	M
Evangeline	M
Franklin	M
Morehouse	M
Orleans	M
Ouachita	M
Red River	M
SaintLandry	M
SaintMartin	M
SaintTammany	M
Vernon	M

Table E-42 (continued)

Parish	Ranking
Washington	M
West Feliciana	M
Acadia	L
Ascension	L
Assumption	L
Avoyelles	L
Calcasieu	L
Grant	L
Iberia	L
Lafourche	L
LaSalle	L
Lincoln	L
Livingston	L
Pointe Coupee	L
Richland	L
SaintHelena	L
SaintJames	L
SaintMary	L
Tangipahoa	L
Union	L
Webster	L
West Carroll	L
Winn	L
Cameron	N
East Carroll	N
Iberville	N
Jefferson	N
Jefferson Davis	N
Lafayette	N
Madison	N
Plaquemines	N
SaintBernard	N
SaintCharles	N
SaintJohn the Baptist	N
Tensas	N
Terrebonne	N
Vermilion	N
West Baton Rouge	N

Map E-19: Dam Hazard Ranking



Source: USACE

Methodology

Dam vulnerability was assessed for the population and general building stock (residential, commercial, industrial, governmental, educational, agricultural and religious) and contents for parishes with high hazard dams (per USACE classifications). Levee vulnerability was assessed for the population. Building exposure was generated with HAZUS-MH inventory.

Table E-43 lists the number of dams (per USACE inventory) by parish and Map E-20 shows the dam location in relationship to population density.

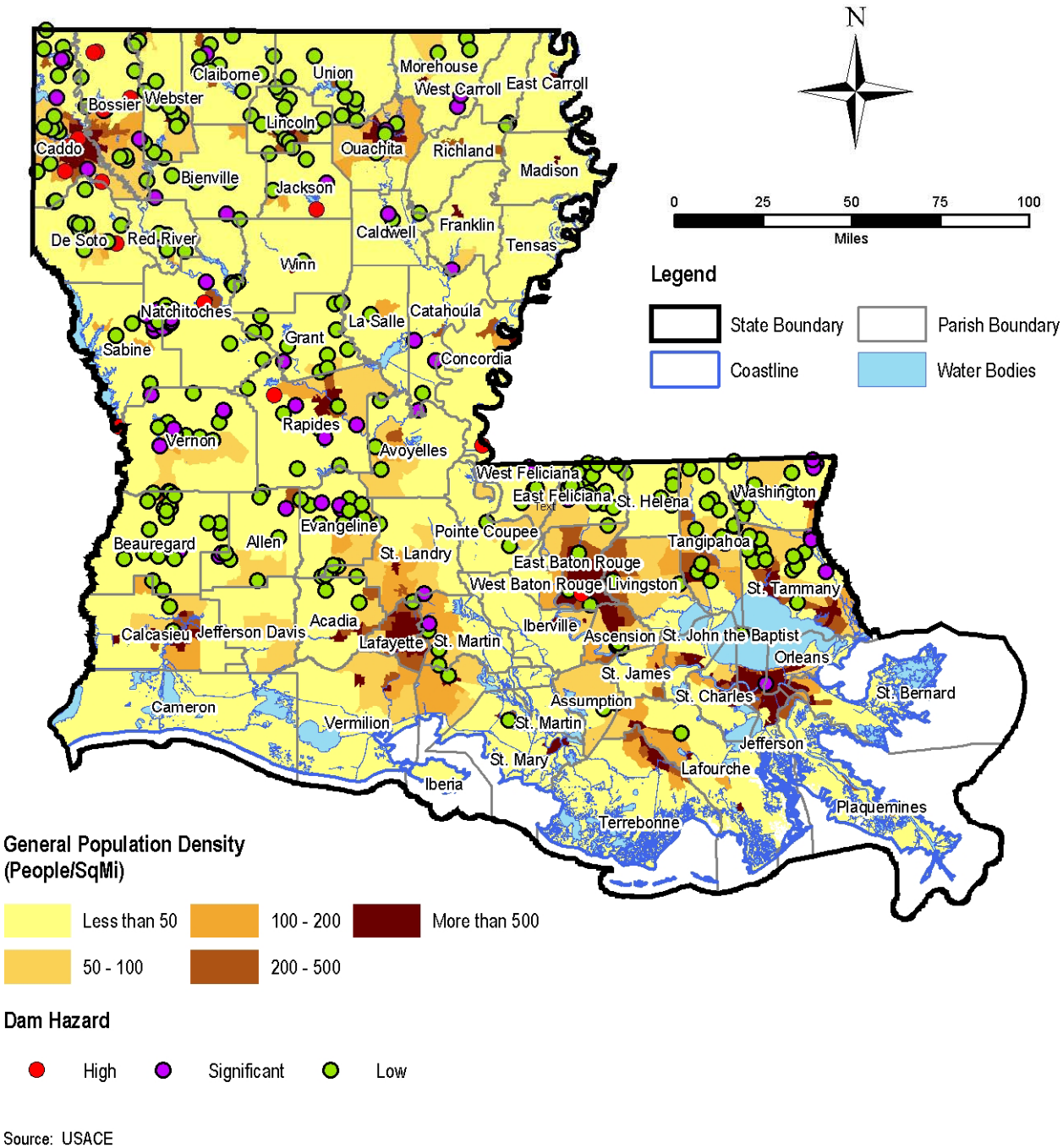
Table E-43. Dam Inventory by Parish and Hazard Levels

Parish	Total Dams	Hazard Level of Dam		
		High	Significant	Low
Acadia	2			2
Allen	9		3	6
Ascension	4			4
Assumption	2			2
Avoyelles	3			3
Beauregard	20		1	19
Bienville	4		2	2
Bossier	14	4	2	8
Caddo	23	4	3	16
Calcasieu	3			3
Caldwell	4		2	2
Catahoula	5		4	1
Claiborne	11		1	10
Concordia	1	1		
Desoto	11	1		10
East Baton Rouge	5	1		4
East Feliciana	20		1	19
Evangeline	15		3	12
Franklin	1		1	
Grant	11			11
Iberia	2			2
Jackson	5	1	1	3
Lafourche	1			1
Lasalle	1			1
Lincoln	16			16
Livingston	2			2
Morehouse	5		2	3
Natchitoches	18	1	10	7
Orleans	1		1	
Ouachita	4		1	3
Pointe Coupee	2			2
Rapides	10	1	3	6
Red River	5		1	4
Richland	1			1
Sabine	11	1	6	4

Table E-43 (continued)

Parish	Total Dams	Hazard Level of Dam		
		High	Significant	Low
St.Helena	4			4
St.James	6			6
St.Landry	7		1	6
St.Martin	3		1	2
St.Mary	1			1
St.Tammany	15		2	13
Tangipahoa	15			15
Union	8			8
Vernon	13		4	9
Washington	15		6	9
Webster	15			15
West Carroll	2			2
West Feliciana	5		1	4
Winn	2			2
TOTAL	363	15	63	285

Map E-20: Dam Location by Parish



Source: USACE

The HAZUS-MH inventory was developed as follows:

The HAZUS-MH general building stock data provides the building valuation for each specific occupancy classification (e.g., single family residential, retail trade) developed from the 2000 U.S. Census and Dun & Bradstreet. The general building stock data set includes the residential, commercial, industrial, governmental, educational, agricultural and religious buildings for each parish. This data was developed at the census block level and then aggregated at census tract or parish levels. This data set is from the 2000 version of TIGER/Line files and first quarter of 2002 data from D&B. The dataset was developed by applying RS Means replacement values for typical building floor areas and construction for each specific occupancy, which is a nationally accepted reference on building construction costs and is published annually.

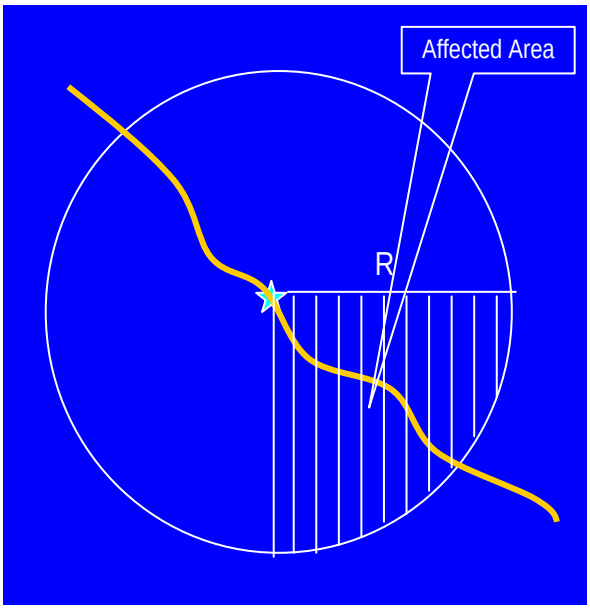
Population and general building stock exposure to dam failure was used to determine vulnerability. Specifically, population exposure to high hazard dams was used to determine vulnerability based on the National Inventory of Dams classifications, as follows:

Class	Loss of Human Life	Economic, Environmental, Lifeline Losses
Low	None Expected	Loss; generally limited to owner
Significant	None Expected	Yes
High	Probable	Yes (but not necessary for this classification)

Population exposure to high hazard dams was chosen for analysis because of the potential harm to human life and buildings. High hazard dams are likely to cause fatalities and economic loss.

The analysis for population exposure used U.S. Census 2000 data overlaid with the locations of high hazard dams from the National Inventory of Dams to determine populations located in areas at risk. A quarter-circle downstream area with a 15-mile radius was assumed to be the at-risk area; it is assumed that the effect in human life and building damage beyond a 15 mile radius will be negligible (refer to Figure E-4).

Figure E-4. Area At Risk for Dam Failure



Results

The size of the at-risk area for each dam was estimated as a function of the maximum capacity of the dam. It was assumed that dams would fail by being breached or overtopped, most likely when the maximum capacity was reached. However, when a calculated radius size of 15miles was exceeded, a 15-mile radius was substituted since the potential impact beyond this radius is considered negligible.

The results of the population exposure to high hazard dams are reported in Table E-44.

Table E-44. Population Exposure to High Hazard Dams in Louisiana

Dam Name	Parish	Population	Elderly Population	Low Income Population
Cross Lake Dam And Spillway	Caddo	111,671	12,879	12,949
Bayou Bodcau Dam	Bossier	42,802	3,720	2,638
Sibley Lake Dam	Natchitoches	5,671	362	904
Old River	Concordia	7,779	428	406
Cotile Lake Dam	Rapides	2,227	240	331
Cypress Bayou No 1	Bossier	1,057	161	184
Toledo Bend	Sabine-LA; Newton-TX	1,346	181	150
Wallace Lake Dam	Caddo	1,166	160	130
Pennington Lake Dam	East Baton Rouge	1,004	99	41
Caney Creek Dam	Jackson	282	33	35
Hideaway Harborlake	Caddo	549	97	22
Dolet Hills Make-Up Water Pond	Desoto	101	13	17
Cypress Bayou No 3	Bossier	120	18	16
Cypress Bayou No 2	Bossier	220	20	6

The analysis for the general building stock exposure used HAZUS-MH general building stock data and the locations of high hazard dams from the National Inventory of Dams. The general building stock data was overlaid with the expected at-risk areas to determine the number of buildings and value that is exposed. The results for the number of buildings with exposure to high hazard dams are reported in Tables E-45.

Table E-45. Building Exposure (Number) to High Hazard Dams in Louisiana

Dam Name	Parish	Building Count (Number)							
		Residential	Commercial	Industrial	Agricultural	Religious	Governmental	Educational	Total
Cross Lake Dam And Spillway	Caddo	40,703	510	34	1	30	45	2	41,325
Bayou Bodcau Dam	Bossier	17,749	153	12	1	6	34	2	17,957
Old River	Concordia	1,440	4	1	1	0	0	0	1,446
Sibley Lake Dam	Natchitoches	1,285	9	2	4	1	1	1	1,303
Cotile Lake Dam	Rapides	900	6	1	1	1	0	1	910
Pennington Lake Dam	East Baton Rouge	672	19	3	1	7	15	0	717
Toledo Bend	Sabine-LA; Newton-TX	605	1	0	0	0	0	0	606
Wallace Lake Dam	Caddo	588	4	1	1	0	0	0	594
Cypress Bayou No 1	Bossier	445	4	2	0	1	0	0	452

Table E-45 (continued)

Dam Name	Parish	Building Count (Number)							
		Residential	Commercial	Industrial	Agricultural	Religious	Governmental	Educational	Total
Caney Creek Dam	Jackson	340	1	0	0	0	0	0	341
Hideaway Harborlake	Caddo	203	2	0	0	2	0	0	207
Cypress Bayou No 2	Bossier	125	2	1	0	0	0	0	128
Cypress Bayou No 3	Bossier	56	0	0	0	0	0	0	56
Dolet Hills Make-Up Water Pond	Desoto	44	0	0	0	0	0	0	44

The results for building exposure values are reported in Table E-46.

Table E-46. Building Exposure (Valuation) to High Hazard Dams in Louisiana

Dam Name		Building Exposure ($1,000)							
		Residential	Commercial	Industrial	Agricultural	Religious	Governmental	Educational	Total
Cross Lake Dam and Spillway	Caddo	5,596,976	770,019	113,297	9,496	61,226	42,412	29,269	6,622,695
Bayou Bodcau Dam	Bossier	2,195,328	180,451	38,331	2,751	13,500	28,944	8,348	2,467,653
Sibley Lake Dam	Natchitoches	178,873	11,775	1,445	6,066	514	459	1,087	200219
Old River	Concordia	172,455	2,070	115	97	0	0	0	174737
Pennington Lake Dam	East Baton Rouge	111,030	25,009	716	51	9,930	11,797	0	158533
Cotile Lake Dam	Rapides	81,657	8,550	111	62	970	0	1,086	92436
Wallace Lake Dam	Caddo	52,010	1,578	319	39	0	0	0	53946
Cypress Bayou No 1	Bossier	48,307	1,714	310	0	541	0	0	50872
Toledo Bend	Sabine-LA; Newton-TX	49,981	275	0	0	0	0	0	50256
Hideaway Harborlake	Caddo	28,850	157	0	0	2,569	0	0	31576
Caney Creek Dam	Jackson	29,310	111	0	0	0	0	0	29421
Cypress Bayou No 2	Bossier	13,979	297	116	0	0	0	0	14392
Cypress Bayou No 3	Bossier	5,031	0	0	0	0	0	0	5031
Dolet Hills Make-Up Water Pond	Desoto	3,546	0	0	0	0	0	0	3546

Data Limitations

Loss estimation using the Flood Wizard can be done if inundation maps including flood depth are made available. For the Old River dam, volume was used in the analysis instead of unknown maximum capacity. The affected vulnerability results for Toledo Bend dam are only for Louisiana; Texas is not included. Breckenridge Lake dam (Caddo Parish) is not included, as the maximum capacity and volume are unknown. The affected vulnerability results

for one dam might include areas in more than one parish, thus the population could exceed the number for the parish where the dam is located.

Hazard Ranking – Levee Failure

The levee hazard ranking was based on the parishes that have the highest population exposure to levee failure. For the levee analysis, it was assumed that any area adjacent to the levee could be flooded, since inundation maps were not provided for this analysis. The parishes ranked according to population exposure are reported in Table E-47 and Map E-21.

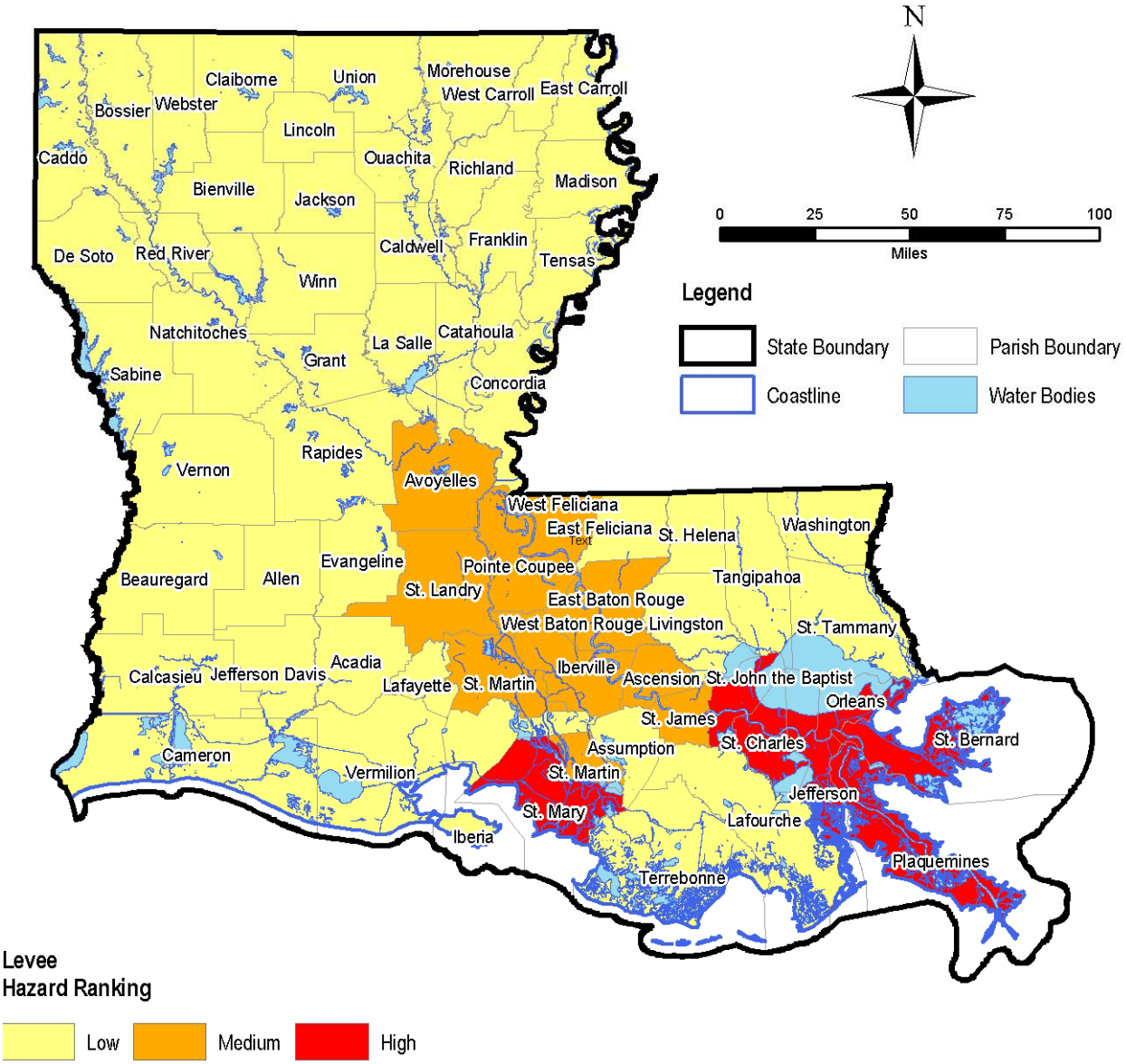
Table E-47. Parishes Ranked by Population Exposure to Levee Hazard

Rank	Parish	Population	Ranking
1	Orleans	112,739	High
2	Jefferson	103,608	High
3	Plaquemines	23,334	High
4	Saint Bernard	22,754	High
5	Saint Charles	20,484	High
6	Saint Mary	17,456	High
7	Saint John the Baptist	11,832	High
8	Iberville	9,129	Medium
9	Saint James	8,366	Medium
10	West Baton Rouge	7,068	Medium
11	East Baton Rouge	6,794	Medium
12	Ascension	5,537	Medium
13	Avoyelles	3,881	Medium
14	Saint Landry	3,421	Medium
15	West Feliciana	3,373	Medium
16	Pointe Coupee	2,923	Medium
17	Saint Martin	2,470	Medium
18	Assumption	277	Low
19	Concordia	20	Low
20	Iberia	1	Low
21	Acadia	-	Low
21	Allen	-	Low
21	Beauregard	-	Low
21	Bienville	-	Low
21	Bossier	-	Low
21	Caddo	-	Low
21	Calcasieu	-	Low
21	Caldwell	-	Low
21	Cameron	-	Low
21	Catahoula	-	Low
21	Claiborne	-	Low
21	De Soto	-	Low
21	East Carroll	-	Low
21	East Feliciana	-	Low
21	Evangeline	-	Low

Table E-47 (continued)

Rank	Parish	Population	Ranking
21	Franklin	-	Low
21	Grant	-	Low
21	Jackson	-	Low
21	Jefferson Davis	-	Low
21	La Salle	-	Low
21	Lafayette	-	Low
21	Lafourche	-	Low
21	Lincoln	-	Low
21	Livingston	-	Low
21	Madison	-	Low
21	Morehouse	-	Low
21	Natchitoches	-	Low
21	Ouachita	-	Low
21	Rapides	-	Low
21	Red River	-	Low
21	Richland	-	Low
21	Sabine	-	Low
21	Saint Helena	-	Low
21	Saint Tammany	-	Low
21	Tangipahoa	-	Low
21	Tensas	-	Low
21	Terrebonne	-	Low
21	Union	-	Low
21	Vermilion	-	Low
21	Vernon	-	Low
21	Washington	-	Low
21	Webster	-	Low
21	West Carroll	-	Low
21	Winn	-	Low

Map E-21: Levee Hazard Ranking



Methodology

Population exposure to levees was used to determine vulnerability. Only population exposure was used to examine this hazard, since levee failure can happen suddenly and catastrophically impact people. The analysis for population exposure used U.S. Census 2000 data and USACE levee data. U.S. Census data was overlaid with the levee data to identify the population that live within a ½ mile of each levee in Louisiana. The ½ mile area was chosen because it represents the immediately impacted area should a levee fail.

Results

Table E-48 presents population exposure for the general population, as well as elderly and low- income populations.

Table E-48. Population Exposure to Levee Failure (Within ½ Mile From the Levee) in Louisiana

Parish	Total Population	Elderly	Low Income
Ascension	5,537	610	752
Assumption	277	36	31
Avoyelles	3,881	539	688
Concordia	20	3	2
East Baton Rouge	6,794	381	1,719
Iberia	1	0	0
Iberville	9,129	1,196	1,239
Jefferson	103,608	13,558	9,812
Orleans	112,739	13,621	13,318
Plaquemines	23,334	2,336	2,246
Pointe Coupee	2,923	379	407
Saint Bernard	22,754	2,396	2,246
Saint Charles	20,484	2,039	1,511
Saint James	8,366	990	939
Saint John the Baptist	11,832	1,347	1,490
Saint Landry	3,421	431	586
Saint Martin	2,470	223	245
Saint Mary	17,456	2,177	2,406
West Baton Rouge	7,068	735	644
West Feliciana	3,373	62	29

Data Limitations

Loss estimates could not be provided due to the lack of inundation maps attributed to levee failures.

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